City Ex. 1

STATE OF ILLINOIS
ILLINOIS COMMERCE COMMISSION

OFFICIAL FILE
I.C.C. DOCKET NO. 00-0720
City Exhibit No. 1
Witness
Date 8/28/0 Reporter

Illinois Commerce Commission, On Is On Motion,	)
v.	) Docket 00-0720
Peoples Gas Light and Coke Company, Respondent.	)
Reconciliation of Revenues Collected Under Gas Adjustment Charges with Actual Costs Prudently Incurred.	)

PREPARED DIRECT TESTIMONY
OF ROBERT J. MICHAELS
ON BEHALF OF THE
CITY OF CHICAGO

May 31, 2001

I. INTRODUCTION

A. Education and Employment

Q. Please state your name, positions, and address.

A. My name is Robert J. Michaels. I am Professor of Economics at California State University, Fullerton, and Affiliate Consultant with Tabors, Caramanis & Associates (TCA) of Cambridge, Massachusetts. My business address is 1440 N. Harbor Blvd., Suite 800, Fullerton, California 92835. My e-mail is rmichaels@tca-us.com.

Q. Please describe Tabors, Caramanis & Associates.

A. TCA is a firm of engineering and economic consultants with extensive experience in the restructuring of the U.S. electricity and gas industries. The firm's experts have testified before federal and state courts, state regulatory commissions and the Federal Energy Regulatory Commission (FERC). TCA is headquartered at 50 Church St., Cambridge, Massachusetts 02138. Additional information on the firm is available at www.tca-us.com.

Q. Please describe your professional background.

A. The following summarizes my biography, which is attached as Exhibit RJM-1. I hold an A.B. degree from the University of Chicago and a PhD from the University of California, Los Angeles, both in economics. I began my professional career as Staff Economist at the Institute for Defense Analyses, then in Arlington, Virginia, where I performed research in the mid-1970s for the Department of Defense and other federal agencies. I then returned to California as Associate Professor of Economics at California State University, Fullerton, and was promoted to Professor of Economics in 1980. Since that time I have also taught as adjunct faculty at the University of Southern California's Graduate School of Business and in the Claremont Graduate School's PhD program in economics. I currently serve as Co-Editor of *Contemporary Economic Policy*, a peer-reviewed journal of the Western Economic Association.

B. Consulting and Research

Q. Please describe your background in economic consulting.

A. During the 1980s I began working as an independent consultant on FERC proceedings and antitrust litigation in electricity. In that period I also consulted on open access to interstate gas pipelines and advised the

Treasury of New Zealand on the competitive implications of electricity denationalization. In 1992 I joined JurEcon, Inc. of Los Angeles, where I performed economic analyses of contract damages, international transfer prices, and the merger between the Union Pacific and Southern Pacific railroads. In 1994 and 1995 I testified as an invited expert at the California Public Utilities Commission's (CPUC) initial hearings on electrical restructuring. I also testified before the California Energy Commission on issues in electrical market design. In 1996 I joined Hagler Bailly Consulting of Arlington, Virginia (now PA Consulting) as Senior Advisor, while maintaining my professorship and residence in California. My work for that firm included an affidavit before the FERC on the Long Island Power Agency's takeover of Long Island Lighting Company. In 1998 I co-authored a frequently-cited study of price spikes in midwestern electricity markets during the summer of that year.

In 1999 I joined Econ One Research Inc., a consulting firm in Los Angeles as Special Consultant. In March and April of that year I authored three affidavits, filed at FERC (Dockets No. ER98-2843-006 et al and ER98-2843-007 et al), analyzing reports by the California Power Exchange (PX) and Independent System Operator (ISO) on competition in the state's new electricity markets and on reform of Reliability Must-Run (RMR) contracts for generators. Later in 1999 I testified on utility rate designs in the CPUC's docket on post-transition electrical ratemaking. In 2001 I joined TCA as Affiliate Consultant.

Q. Have you ever testified before the Illinois Commerce Commission (the Commission or ICC)?

A. Yes. In 1997 I submitted direct and rebuttal testimony in ICC Docket No. 95-0551. The Commission requested that I analyze the potential impact of the merger between Union Electric and Central Illinois Public Service Company on retail competition in Illinois. Although Illinois at the time had retail monopoly, the Commission was concerned about its effects on competitive markets that were under consideration at the time.

Q. Please describe your professional and research activities.

A. In recent years I have published numerous articles in both professional and trade journals on the restructuring of the electricity and gas industries. Among other outlets, they have appeared in *Public Utilities Fortnightly*, *The Electricity Journal*, *Natural Gas*, *Regulation*, and *Energy Law Journal*. Publications on the gas industry include

"The New Age of Natural Gas: How the Regulators Brought Competition" [*Regulation*, 1993]

"Reducing Risk, Shifting Risk, and Concealing Risk: Why are there Long-Term Gas Contracts?" [chapter in J. Kalt and J. Ellig (Eds.), *New Horizons in Natural Gas Deregulation*, 1996]

(Co-author with Charles G. Stalon) "Decontrol of Wellhead Prices and the First Wave of Gas Industry Restructuring" [Chapter in A. Tussing and B. Tippee (Eds.), *The Natural Gas Industry*, 2nd Ed., 1995]

(Co-author with Arthur S. De Vany) "Market-Based Rates for Interstate Gas Pipelines: The Relevant Market and the Real Market" [*Energy Law Journal*, 1995]

"Preparing for Gas-Electric Convergence: Mergers or Alliances," [chapter in A. Faruqui and J.R. Malko (Eds.), *Customer Choice: Finding Value in Retail Electricity Markets*, 1999]

I also participate frequently in public forums and gas and electric industry conferences. I have at times organized and chaired them. My biography (Exhibit _____ (RJM-1)) includes a list of appearances over the past six years. In March of 1996 I testified on financial aspects of electricity deregulation before the U.S. House of Representatives Subcommittee on Energy and Power.

C. Purpose and Scope of Testimony

Q. Please describe your role in this proceeding.

A. I have been retained by the City of Chicago to testify on the gas purchase behavior of The Peoples Gas Light and Coke Company ("Peoples Gas" or "Peoples"), a division of Peoples Energy Corporation ("Peoples Energy"). Specifically, I will testify on the prudence of Peoples' continuing choice not to engage in financial hedging (to be defined below) when making those purchases.

Q. Please provide a summary of your testimony.

A. I begin by putting Peoples' behavior in the context of the gas industry's evolution. Since the 1980s gas has become both "commoditized" and "financialized." In earlier times, local distribution companies (LDCs) obtained their gas under long-term sales contracts with pipelines at inflexible prices.

Now they purchase nearly all of their gas on a short-term commodity basis, or under longer-term contracts where prices change quickly with the commodity price. Competitive gas markets provide numerous benefits to both buyers and sellers, but many market participants wish to insulate themselves from unpredictable fluctuations in prices. To do so, they actively manage their gas storage and trade a wide variety of financial instruments (futures, options, swaps, etc.).

Public utility regulators adapted to the volatility of competitive gas prices by introducing purchased gas adjustments (PGAs) into the rate structures of LDCs. PGAs changed rates paid by gas users to include amounts sufficient to cover the costs of obtaining gas supplies. PGAs ensured the financial viability of LDCs in the face of price fluctuations that they could not directly control, and minimized the ongoing costs of the regulatory process by eliminating the need for costly, repetitive ratemaking proceedings. PGAs continue to allow regulators to examine the prudence of an LDC's gas acquisition practices, and to order disallowances as necessary, in proceedings of limited scope. Regulators may sometimes also introduce incentive regulation to reward LDCs for successful efforts to reduce their costs. The effects of PGAs are not invariably desirable ones, particularly for users who cannot avail themselves of competitive suppliers. Depending on how they are administered, PGAs can allow the regulated LDC to shift gas price risk away from its shareholders and onto the LDC's users.

I next discuss some basic ideas about hedging and risk management that are necessary to put Peoples' choices into context. In the recent past, the industry has produced an increasing variety of "derivatives" to meet the increasingly complex risk situations in which buyers and sellers find themselves. Price fluctuations are inevitable, but financial hedge instruments are available to mitigate the harm caused by their unpredictability. Hedges benefit users by lessening their need to adjust to price instability, while still allowing prices to signal the markets overall supply/demand situation. Hedging cuts the variability of price, though not necessarily its average.

Most buyers and sellers with large risk exposures hedge both physically and financially, using exchange-traded and over-the-counter instruments. Financial hedges are valuable because of their liquidity and their ability to spread risk without requiring physical deliveries of gas, although those deliveries are often possible.

With this background, I consider Peoples' failure to financially hedge its gas supplies during reconciliation year 1999-2000. Futures prices prior to the winter months were both rising and increasing in volatility. Between spring and winter of 1999 Peoples used these higher, more volatile projected prices both for long-term forecasting and in formulating its short-term operating

strategies. Peoples Energy's other divisions engage in extensive financial hedging, as do many of Peoples' customers who arrange for their own gas and take only transportation service from the company. The firms that provided supply contract proposals to Peoples were explicit about their hedging strategies.

Regulated LDCs have been slower to engage in financial hedges than other purchasers, sellers, and marketers of gas, probably due in large part to the ability to shift some or nearly all price volatility risks to customers using PGA mechanisms. Small customers in particular are exposed to volatility that they cannot eliminate by their own actions, but that their LDC could. In this context, effective regulation must do more than set rates that recover costs and provide a fair return to investors. It must also provide incentives for the LDC to produce at least-cost, and to adopt practices that a protected monopolist might not need to try in order to maintain its revenues. Elsewhere in the country, a substantial and growing number of LDCs have responded to the risks of price volatility by utilizing financial hedges.

Even if spot and futures prices had been relatively stable, there would have been little justification for Peoples' choice not to hedge. Futures prices reflect only today's expectations and information, and cannot possibly incorporate unforeseen events that will happen between now and the contract month. Hedging protects against precisely those events. At least one other LDC in Illinois – AmerenCIPS – saw the same data, chose to hedge, and its customers were clear beneficiaries of the choice.

Peoples had no discernible reason to fear a disallowance by the ICC in the event that winter cash prices turned out lower than the prices of the futures that Peoples might have purchased. The ICC has no history of gas purchase disallowances since the beginnings of competitive gas markets, and evidence from its treatment of other Illinois utilities indicates that it is not averse to hedging programs. The ICC has not objected to any known delivery or storage strategy chosen by Peoples. Given the amounts at stake and the volatility in the market, Peoples should have acted to moderate those risks for its customers just as its unregulated affiliates did for Peoples Energy shareholders. If, despite the Commission's history in this regard, Peoples had a concern about recovering the costs of prudent risk management practices, it could have pressed the Commission for a definitive ruling.

I conclude that Peoples should have engaged in a prudent hedging strategy, on the basis of the facts and rationales discussed above. Inaction and indifference were not prudent responses to the market data available to Peoples that showed rising prices and substantial volatility. This conclusion does not reflect "20-20 hindsight." If hedging is allowed, it will in some years yield prices to customers that are higher than would occur without hedging,

and the Commission should justifiably deny the requests of intervenors who want to penalize LDCs in years when that happens. My recommendation that the Commission affirm the value and acceptability of a hedging policy stands regardless of the future of transportation programs for small consumers. Large transportation customers can put their own hedges in place or look for marketers with preferred hedging policies. Extending transportation programs to small users and permitting marketers to aggregate their loads in no way lowers the value of hedging for those who remain with Peoples.

Q. Does your testimony provide an estimate of any overcharges or damages that resulted from Peoples' choice not to hedge financially?

A. No. The scope of this proceeding established in the Commission's Initiating Order does not include the 2000-2001 winter heating season – the period in which retail customers most acutely felt Peoples' failure to have a prudent hedging strategy in place.

II. THE EVOLUTION OF HEDGING IN NATURAL GAS

Q. Has hedging always been important in the gas industry?

A. No. During most of the gas industry's history, issues of hedging and risk were of little importance to state regulatory agencies. Prior to the 1980s, the supply chain for gas was quite different from today's. Interstate pipelines purchased gas in the field from producers and resold it to LDCs, passing through its average cost. To fulfill their supply obligations, pipelines purchased most of their gas under long-term contracts at prices that did not vary. Thus pipelines paid predictable prices for their gas supplies and so did LDCs, who passed the cost on to consumers. During the 1960s and 1970s wellhead prices were controlled at levels that created shortages and fears of supply exhaustion, with no short-term markets available for gas that traded in interstate commerce. There was simply no major source of price instability, and regulators were more concerned with deliverability risks due to the shortages.

Q. How have the gas markets evolved from long-term to short-term?

A. As the industry entered the 1980s, pipelines obliged to serve LDCs signed "take or pay" contracts with producers. As gas prices began to rise with phased decontrols, industrial users consumed less and the pipelines found themselves with surplus gas that they had to pay for. To deal with the problem, that gas came to be sold in short-term markets and pipelines

changed from being resellers of gas to "open-access" transporters of it for producers and LDCs. The short-term market thrived as gas production expanded with the decontrol of prices and LDCs found that they could often obtain their supplies more economically at short-term prices than under long-term contracts with pipelines. As LDCs became responsible for arranging their own supplies, deliverability risk diminished, but price risk multiplied and LDCs faced prices that fluctuated as they had not in the past. A new industry of marketers arose to reallocate risk and to facilitate transactions in gas and in the pipeline capacity needed to deliver it. Risks akin to those faced by LDCs were also felt by large gas users who in some states had gained rights to make their own transactions with distant producers and to use interstate pipelines and pipes owned by their LDCs to effect deliveries.

Q. How did the gas market's participants adapt to these new risks?

A. Producers, marketers, and large users began to devise physical contract and financial instruments to help hedge the near-term price risks that had become endemic in the industry. Some were designed for individual transactions or over-the-counter trades, but by the 1990s risk management in the industry was dominated by the Henry Hub futures contract traded on the New York Mercantile Exchange, which supported an active over-the-counter market in customized risk management products. I discuss that contract in more detail in Section V below.

Q. Your previous answer did not mention LDCs. Why?

A. For reasons detailed in the testimony that follows, LDCs were, for the most part, slow to adopt techniques of risk management that by the 1990s had become common for almost everyone else that bought or sold gas in large quantities. The principal factor in their disparate response was the effect of purchased gas adjustment mechanisms.

III. THE REGULATION OF LDC GAS PURCHASING

Q. What is the economic significance of a "purchased gas adjustment clause"?

A. Price regulation requires a lengthy and complex proceeding if regulators are to ensure that consumers pay no more than the utility's prudently incurred costs of service and investors receive an adequate return on their capital. When expenses are stable and predictable, general rate cases typically take place only at intervals that are several years apart.

During the energy crises of the 1970s, prices of all major fuels became higher and less predictable. An LDC whose gas purchase costs were fixed in an earlier general rate case might find itself taking losses due to price increases that were beyond its control. The LDC might also be earning excessive rates of profit because gas prices had fallen since its last rate case. Regulators in nearly all states instituted purchased gas adjustment provisions that allowed utilities to promptly change rates to account for fluctuations in these costs. The PGA eliminated a need for frequent rate cases and rendered the finances of LDCs more predictable.

Q. Do PGAs eliminate the risk of such price changes?

A. No. They make the incomes of LDCs more predictable by passing some or all of that risk to customers. Peoples' response to the ICC's 2001 Gas Price Notice of Inquiry (Docket No. 01 NOI-1) acknowledges that:

> ... Peoples Gas and North Shore are not currently exposed to market risk caused by changes in commodity prices. This is due to current Illinois rate regulation, which allows for recovery of gas costs through the purchase gas adjustment clause. (P. 35)

This practice shifts risk rather than eliminating it, and makes the bills faced by Peoples' retail customers less predictable. If retail customers are averse to risk, the PGA makes them worse off.

Q. Do levelized customer payment plans mitigate the effects of the PGA passthrough?

A. To some extent they lower the variability of customer bills. If part of the LDC's gas supply is financially hedged, however, there will be less underlying variability.

Q. What other effects on customers might PGAs have?

A. It is possible that the presence of a PGA might encourage LDC behavior that is detrimental to consumers. The LDC may not watch its gas supply costs as assiduously if their passthrough is guaranteed than it would if passthrough is less certain. Some research by economists has found higher production

costs for electric utilities that can automatically pass on their costs of generator fuel and purchased power supplies than for utilities that cannot.[1]

IV. HEDGING AND RISK MANAGEMENT

A. Hedging

Q. What is a hedge?

A. According to an industry reference, "a hedge is a transaction entered into for the purpose of protecting the value of a commodity or a security from adverse price movement by entering an offsetting position in a related commodity or security."[2]

In many cases persons prefer greater certainty about the future and place a premium on risk avoidance. If so, they can trade risks with others who are less risk averse to achieve more certainty. However, like all scarce goods, protection against risks carries a price. I pay a fixed premium to an insurer to protect against fire, but choose not to insure against all risks because doing so is too costly. Others take the opposite risky position, but must be compensated sufficiently to make them take on these risks voluntarily. As in other markets, both sides can benefit by the reallocation of risks.

Q. Assume the price of a certain commodity that I need year-round is highly volatile, i.e., it varies widely and unpredictably relative to its average. Can I protect myself against risk by buying and holding the commodity for my own use?

A. A physical hedge such as this can give partial protection. If I want to consume bread at a uniform rate over the year, I can buy wheat when it looks cheap, store it, and use it as time passes. I am protected from a higher price in the cash market, but the protection is costly. First, I tie up funds that could have earned a return elsewhere in a commodity that offers me no financial return. Second, I still bear the risk that the market price of the good will fall over the year.

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[1] See references in Robert J. Michaels, "Fuel Cost Adjustments: An Idea Whose Time Has Gone," *The Electricity Journal* 7 (Feb. 1994), 78-85.

[2] Fletcher J. Sturm, *Trading Natural Gas: a Nontechnical Guide* (PennWell Books, 1997), p. 32.

A financial hedge such as an exchange-traded futures contract likewise can only give partial protection. The purchaser of a contract pays its current price for future delivery of the good. The price of that contract will vary over its life as information (e.g., weather forecasts for a farm or fuel commodity) accumulates. If I buy a futures contract and the cash price of the commodity falls below the contract price, I have taken a loss in the same way that the holder of storage inventory has.

Q. If instead of paying a large amount of cash once a year and holding my own inventory I contract with a seller who offers me my monthly requirements at a fixed cash price per month, how has the allocation of risk changed?

A. A fixed-price contract such as this one does not remove risk. It shifts the risk, and the desirability of shifting depends on the costs and benefits. Unless spot prices are expected to fall substantially, the seller is likely to charge a premium for the fixed stream since it must be compensated for bearing the uncertainty. If market price wanders from month to month, the longer a fixed-price contract runs the farther the price is likely to be from the actual market price. The buyer benefits if market price rises and loses if it falls, but in either case a fixed-price contract stabilizes the seller's income.

Q. Can hedging reduce the average price I pay for a product relative to cash transactions?

A. There is no assurance that it will do so. In the physical buy-and-hold strategy, I only buy because I expect higher cash prices in the future. I hope to avoid paying more in the future by buying at what I think is low price today. The person who sells the commodity to me has opposing expectations — i.e., he or she believes that price will fall below the level we settled on and selling to me avoids a capital loss. Prices that entail commitments (e.g., for future delivery) incorporate both the buyer's and seller's differing expectations about market conditions that will prevail in the future.

What hedging can offer is greater certainty about price, and that certainty can increase with the complexity of the hedging activity. I can, for example put a "collar" on price by simultaneously holding a put option (option to sell) and a call option (option to buy) whose strike prices bracket an acceptable range of variation. However low the market price, I can sell the good for the strike price of the put option, and however high it is I can buy it at the strike price of the call. The options themselves, however, are written by people with expectations that differ from mine, and I must pay market-determined prices for them.

B. Diversification

Q. What other methods might one use to reduce price risk?

A. Another strategy is diversification. Diversification cuts risk because it allows me to better avoid extreme outcomes. Assume I hold two investments whose returns vary at random but are not highly correlated (i.e., good performance of one is only infrequently associated with good performance of the other). Only if both perform poorly do I take the largest possible loss, whereas if I am specialized in only one, the probability I will take the largest possible loss is greater. There is a decrease in the variability of the returns because it is relatively more likely that one will perform well and the other will not.

Q. If I combine some fixed-price supply contracts with contracts that are market-sensitive have I cut my overall risk?

A. Yes. In the event market prices rise I am protected from their full impact by the presence of a fixed-price arrangement for some of my supply. In the event market prices fall, I am able to purchase some of my supply more cheaply because I hold market-sensitive contracts. There is, however, a tradeoff. The larger my holding of market-sensitive contracts, the bigger my loss in the event market prices rise, and the larger my holding of fixed-price contracts, the bigger my loss if market prices fall.

Q. What are the gains if I use both physical and financial hedges rather than rely exclusively on physicals?

A. First, there may be several types of risk that are of concern to me. In addition to price uncertainty, events ranging from natural disasters to supplier bankruptcy can produce deliverability risk for a buyer. If I am a seller, I will be concerned that my counterparty will be unable to pay or otherwise break its contract with me. Diversification among supply sources and partial reliance on a stored inventory are physical hedges that can reduce deliverability and counterparty risk.

Financial hedges, as noted above, are valuable methods for coping with price risk, but they can also make it easier to adjust my risk exposure. Futures contracts, for example, often trade in deep, liquid markets that allow me quickly and cheaply to alter the risks I hold as my expectations change. Depending on details of the situation I may want to hold a variety of hedge assets — futures contracts can alleviate my concerns about price levels, but to deal with volatility I might also take a position in options. In the event the

transaction between myself and one seller has certain unique aspects, we may prefer to use over-the-counter risk management tools. These are more customized than exchange-traded instruments and trade less extensively.

Q. Isn't the use of financial hedges essentially speculation?

A. Speculation is frequently defined as a non-hedged position where a change in a commodity price changes my wealth. The use of financial hedges is no more speculative than the non-use of financial hedges. When I simply buy and hold an inventory, I am speculating that market price will go higher, but leave myself open to the risk that it will be lower, such that I could have satisfied my needs more cheaply on a month-to-month basis. This strategy is mistakenly viewed as non-speculative only because the onlooker sees no specialized financial asset being traded.

V. HEDGING NATURAL GAS

A. Financial Hedging

Q. What financial hedge instruments are available for gas supplies?

A. The most important is the Henry Hub futures contract, traded on the New York Mercantile Exchange (NYMEX) since April 1990. As gas markets have expanded to include more transactions and more types of participants, the use of that contract has risen rapidly. (See, Section VI below.) Contracts exist for deliveries in each of the next 36 calendar months. The contract quantity is 10,000 million British Thermal Units (MMBtu, approximately 10 million cubic feet) for delivery over the month in as uniform as possible a stream at the Henry Hub, a confluence of pipelines in Louisiana. Other instruments soon followed on the contract. In 1992, NYMEX instituted options on gas futures. Alongside exchange-traded instruments has grown an over-the-counter market in options and more complex derivatives such as swaps.

Q. Why would a utility located in Chicago want to make or accept deliveries at a location in Louisiana?

A. A Chicago utility does not want to make or accept deliveries at a location in Louisiana. The Henry Hub establishes a basis for designing risk management tools. Only a small fraction of these contracts go to delivery. Instead, for most buyers, sellers, and marketers they serve as protection against adverse price movements. Traded through an exchange which guarantees

counterparties, they are a highly liquid tool for altering one's risk exposure as market conditions change.

Q. Even if it does not go to delivery in Louisiana, how can a futures contract or other derivative help me deal with price risk for gas used in Chicago?

A. The difference between price at Chicago and price at Henry Hub is known as basis. It fluctuates with changes in regional patterns of production and demand, and with pipeline charges. Certain hedges allow producers or consumers to cut basis risk. For example, assume I am a large user in Chicago and have my supply hedged by holding a Henry Hub futures contract. I still run the risk that the delivered price to Chicago will rise relative to the Louisiana price. To protect myself, I can do an over-the-counter basis swap. I buy the current value of the basis for the duration of my transaction, promising to pay my counterparty a fixed amount per (e.g., month) and making the counterparty responsible for dealing with instability.

Q. Can I use the futures contract to effect delivery in Chicago?

A. Yes, through a process known as Exchange of Futures for Physicals (EFP). A buyer in Chicago who holds a futures contract and a seller wishing to deliver there can negotiate with each other to trade the contract for delivered gas. The negotiation centers on the difference in value between the futures price and the delivered gas. Approximately 90 percent of the futures contracts that go to delivery are traded as EFPs.

B. Physical Hedging

Q. Can an LDC hedge without using financial instruments?

A. Yes, it can handle some deliverability risk and some price risk with storage strategies. However, especially as to price risk, storage strategies' effectiveness is limited. Almost any gas purchase decision is determined in part by considerations of risk. For example, leaving interruptible service aside, LDCs are obliged to make arrangements that will keep sufficient gas on hand for the worst weather conditions that can reasonably be envisioned. They do so by choosing a mix of baseload contracts, swing contracts and storage injections and withdrawals. This mix of delivery patterns and options constitutes a physical hedge.

Q. What other risks can storage hedge against?

A. Storage can also hedge price risk. When market price is high during peak use season, releases from storage are an alternative to purchases. When price is low, injections to storage are in order. The LDC may not have perfect foresight, but this policy potentially allows it to lessen volatility. For billing purposes, extractions from storage are usually priced at their weighted average cost of the gas (WACOG).

Q. Can storage and related policies hedge all price risk?

A. No. For example, unforeseen weather conditions can unpredictably change storage conditions to adversely affect the LDC's financial position. The company will often be able to change its risk exposure more quickly and at lower cost by trading financial instruments rather than gas. Gas in market-area storage (i.e., in or near the LDC's territory) may be far less liquid (e.g., there are fewer probable purchasers if the utility wants to divest it) than financial instruments. Choices regarding storage may be important parts of an LDC's risk management program, but excluding financial instruments from that program needlessly eliminates a potentially important tool that can benefit the LDC's customers and reduce risk for its shareholders.

VI. HEDGING IN REGULATED INDUSTRIES

Q. Alfred E. Kahn, former head of the New York Public Service Commission and scholar of regulation, has written that "[t]he traditional legal criteria of proper public utility rates have always borne a strong resemblance to the criteria of the competitive market in long-run equilibrium."[3] How does LDC regulation comport with the standard of a competitive market?

A. First, that standard underlies calculations of economic efficiency, i.e. least-cost production and rates equal to the marginal costs of serving different customer classes. In practice, regulators must consider more than economic efficiency, for example the equitability of the rates and service obligations they set.

Second, competition is about more than efficiency at a single instant. Over the longer term a seller's survival may depend on its ability to minimize costs and to adopt better technologies and business methods. For a regulated monopoly, survival is usually less of a threat. Hence regulators must to some extent monitor the effectiveness with which regulated firms are acting to minimize their costs and to adopt proven, prudent new techniques. I say "to some extent" because there is also a proper role for managerial discretion

[3] Alfred E. Kahn, *The Economics of Regulation* (reprinted edition, 1989), p. 63.

within the regulated firm, and a gray area between the proper subjects of managerial and regulatory decisions.

Q. Is LDC risk management an area that regulators should monitor for prudent business behavior?

A. The best evidence that it is lies in the speed and thoroughness with which financial innovations have spread through competitive, unregulated industries. The techniques of futures and option analysis are now applied to all sorts of commodity risk, and the range of financial derivatives available to manage risk continues to grow.

Q. What has been the pattern of adoption of the NYMEX futures contract?

A. The contract was introduced in April of 1990 and became the fastest growing contract in the 123-year history of NYMEX.[4] Total open interest (number of contracts in existence) is currently approximately 380,000 (up from 220,000 in 1997), allowing a deep and liquid market.[5] The contract's price is the reference point for numerous over-the-counter instruments. I discuss the adoption of financial hedging by LDCs in the next section.

VII. HEDGING BY ILLINOIS LDCs

A. Hedges at Peoples Energy

Q. What is your understanding of price risk management (hedging) at Peoples Gas?

A. Peoples Gas, the regulated firm, does not actually trade in futures, options, or OTC instruments. But, there are ways in which the company uses data from financial derivatives of gas. Reported futures prices are important inputs for near-term and mid-term supply planning at the company. Peoples forecasts its gas costs using NYMEX futures prices, with accounting for basis differentials (Response to Commission Staff Data Request ENG 2.013). The company's "What's Best" or "Gas Dispatch" Model uses them in a decision-making process to minimize costs in annual, seasonal, and shorter-term applications. (Response to City Data Requests CTY 1.015 and CTY 1.017)

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[4] *Foster Natural Gas Report*, April 6, 1995, p. 17.

[5] *Inside FERC's Gas Market Report*, April 30, 2001, 11; *Gas Daily*, Aug. 18, 1997, 2.

Q. Do other affiliates of Peoples Energy engage in financial hedging?

A. Yes, in roles as both producers and users. In its 2000 Annual Report Peoples Energy states that approximately 74 percent of production in its oil and natural gas properties is hedged for the next 12 months by swaps and options. (Annual Report at 28.) Peoples Energy views these properties themselves as "providing the company a hedge against the effect of gas price fluctuations on [its] other businesses." (Annual Report at 16.)

In its role as consumer, Peoples has hedged 7.3 Bcf of gas purchases for its Elwood power plant, a joint venture with Dominion Resources. The program is intended to "reduce price risk, stabilize cash flow, and extract maximum value from its investment." (Annual Report at 29.) Peoples Energy's total hedged gas rose from 9.3 Bcf to 26.7 Bcf between September 30, 1999 and September 30, 2000.

Finally, on page 3 of its 2000 Annual report, Peoples Energy notes that:

> "In order to mitigate the effect of [extremely warm weather], last year we acquired a weather insurance policy. This helped to soften the effect of warm weather on our financial results for this year. Our weather insurance program is in place for four more years to protect shareholders when we experience extremely warm weather, while we retain the opportunity to benefit when weather is colder than normal."

Insurance of this type can reasonably be considered a financial hedge.

Q. Are the benefits of that insurance policy flowed through to the bills of Peoples' retail customers?

A. According to Peoples' Responses to the ICC's Notice of Inquiry on gas prices, "[t]he insurance premium is paid by Peoples' Energy and any settlement is recorded on the parent company's books." I have found no documentation of a process whereby retail customers enjoy any part of these benefits.

B. Hedging by Customers, Suppliers, and Other LDCs

Q. Is there evidence of financial hedging by Peoples' transportation customers?

A. I have no specific knowledge of customers or hedged volumes, but it is well known in the industry that large users either manage their own hedges or select marketers they deal with partially on the basis of their hedging capabilities.

Q. Is there evidence of financial hedging by Peoples' gas suppliers?

A. Yes. Responses by nine major gas marketers (confidential documents) to Peoples' 1998 Request for Qualification are attached to the company's response to Commission Staff Data Request Eng 2.071. The RFQ explicitly asked about risk management philosophies and tools that respondents utilized. (Attachment 1, p. 4.) All respondents discussed their programs, some at length.

Q. Is there evidence that Peoples was concerned about these risks?

A. The RFQ was issued in response to a proposed ICC fixed price order that "would shift the **price risk, volumetric risk, and non-performance risk and operations risk** from the customers to PEC." (Attachment 3, p. 1, emphasis in original.) Criteria used in the selection process for finalists again included risk management (Attachment 3, p. 2), and points in favor of the winner (Enron) included its being "[w]illing to accept all risk associated with a full-requirements supply contract." (P. 4.)

In its Response to City Data Request CTY 1.009, Peoples states that it considers suppliers' risk management abilities because suppliers with risk management expertise can offer different types of pricing, and because "suppliers with poor risk management capabilities may be less reliable."

Q. Are Peoples' customers protected by market-price-sensitive contracts that are hedged by the suppliers?

A. No. Suppliers who hedge have taken actions to limit their own risk. As noted earlier, the PGA protects Peoples from price risks. Peoples' customers remain subject to the price risks associated with recovery of the market price the company must pay for the gas.

Q. How extensive are financial hedging activities of LDCs elsewhere in the country?

A. The most recent data are available in a report from the American Gas Association.[6] The Association surveyed LDCs regarding various aspects of their operations during the winter of 1999-2000. It found:

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[6] "LDC System Operations and Supply Portfolio Management During the 1999-2000 Winter Heating Season," Energy Analysis 2000-03.

"Forty-seven percent of the LDCs in the survey said they used financial instruments to hedge a portion of their gas supply purchases during the 1999-2000 winter. Of those responding, 22 percent said they hedged more than half of their gas purchases, and 38 percent reported having hedged more than 25 percent but less than 50 percent of their purchases. Fixed-price contracts were the most widely used tool during the 1999-2000 winter heating season, with 58 percent of the LDCs using hedging strategies in the survey hedging as much as 37 percent of the gas volumes delivered to meet their peak-day requirements. Also, 30 percent of LDCs relied on options and futures contracts to hedge their supplies. One company even reported using weather derivatives as a hedging tool." (P. 12)

Respondents to the survey (a total of 73 LDCs responded) included many large LDCs (including Peoples Energy), but information is only available on numbers and percentages of respondents, not on volumes, hedged price volatility in individual markets, or which markets' LDCs chose to hedge.

Q. Do any other Illinois LDCs engage in hedging?

A. Yes, In AmerenCIPS' ICC reconciliation proceeding (Docket No. 00-0711) the person responsible for gas supply and transportation testified on the company's procurement practices. Mr. Scott A. Glaeser reported that the company holds a number of firm supply contracts with producers, for baseload, swing, and peaking gas. Their prices are based on published indices and NYMEX prices. In addition, AmerenCIPS holds some fixed price supply contracts and some of the supply contracts have embedded hedges. As physical hedges the company relies on storage arrangements with pipelines. The company's portfolio varies with the seasons: during the on-peak period it purchases only firm gas, but during off-peak months spot-market gas can be procured at acceptable risk levels. (Direct Testimony at 7-9.)

Q. What are "embedded hedges"?

A. They are financial instruments contained within gas supply agreements. For example, some of the gas in an agreement may be covered by an embedded call option that puts a ceiling on its price over some period. Its structure is the same as an exchange-traded call which gives its holder the right but not the obligation to purchase gas at a predetermined strike price. Likewise, an embedded put option might give AmerenCIPS the right to sell gas that it does not want to take under the contract back to the supplier at a fixed price. Mr. Glaeser described "costless collar" provisions in market-adjusted contracts

that cap the price and also specify a minimum that must be paid per MMBtu regardless of the market price.

C. Peoples' Rationales for its Hedging Behavior

Q. Does Peoples gas engage in financial hedging?

A. In response to Staff Data Request ENG 2.028, Peoples reports that it did not enter into "any physical or financial contracts other than supply contracts indexed to a market price." The company responds to Staff Data Request ENG 2.060 by explaining that

> ... at the time [Peoples] was planning (spring of 1999) for the winter period, projected prices showed little volatility. Accordingly, the use of hedging instruments would not have served the objective of mitigating volatility during the reconciliation period."

Q. Please comment on Peoples' rationale for not using hedges.

A. Peoples price projections during the spring 1999 planning period were no more than NYMEX futures for the winter months. (Response to City Data Request CTY 1.022.) Peoples concluded that they showed little volatility so they chose not to financially hedge any part of its gas supply. (Response to City Data Request CTY 1.022) Hedging would have brought lower prices than actually occurred during the reconciliation period, but that outcome was by no means guaranteed. Peoples also does not explain what it would have done had NYMEX prices been unstable, as occurred later in the year.

In fact, Peoples chose not to hedge during both periods of perceived price stability and periods when the NYMEX prices were unstable. Peoples states that it was not foreclosed from transacting in futures at the end of spring (Response to City Data Request CTY 1.008), and that it observes futures prices over the entire year (Response to City Data Request CTY 1.024). In Illinois, AmerenCIPS saw the same data (but possibly made different projections) and set a goal of hedging a significant fraction of their purchases.

Q. In your last answer, you made statements about price instability. How does one determine instability?

A. One calculates the volatility of observed prices. For these purposes, Peoples adequately defines volatility as "a rapid, unpredictable, short lived (up or down) price fluctuation." (Response to City Data Request CTY 1.022)

Q. You state above that Peoples concluded that projected prices showed little volatility at the time it was planning for the 1999-2000 winter heating season during the spring of 1999. Have you conducted any analysis of price levels and volatility that calls into question Peoples' conclusion?

A. Yes. I and employees of TCA acting under my supervision collected data on futures prices from industry newsletters whose data are often used in such applications as contract indexation. The calculation took year-long "strips" of futures covering the contracts ending in October 1999 through September 2000 (the Reconciliation Year). The prices of the twelve contracts in a strip were averaged for each day the contracts traded, and volatility was computed using the daily averages. Exhibit ___ (RJM-2) graphs the volatility of this futures strip between February and December of 1999.[7]

Q. What do you conclude about Peoples' description of volatility in the spring of 1999?

A. Contrary to Peoples' conclusion, volatility in the Spring of 1999 fluctuated widely. On March 4, the volatility of the contract strip was 8.7 percent (0.087), and by March 31 it had risen by 85 percent, to 16.1 percent (0.161). In less than another month, on April 28 that high figure had fallen by over 50 percent to 0.074, only to rise by 111 percent to 0.156 on May 19. Peoples' "projected prices" are either futures prices themselves or figures derived from them (Response to Commission Staff Data Request ENG 2.013). During the period when they were planning for winter 1999, these prices did not show "little volatility." (Response to Commission Staff Data Request ENG 2.060.)

Q. Were there any other substantial changes in volatility for the contract strip prior to winter 1999?

A. Yes. In September 1999, volatility more than doubled, and then remained at that higher level for the three ensuing months. A sustained change of this size was unprecedented in the years since the deregulation of gas markets. The increase in volatility is a phenomenon quite independent of any change in the average price. Page 2 of Exhibit __ (RJM-2) shows that while price was indeed rising between April and September, its instability is more pronounced during and after September than before.

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[7] In calculating volatility, we took the standard deviation of the natural logarithms of the last twenty days' prices and multiplied it by the square root of 252, the number of trading days in the year. This is a commonly-used formula for calculating annualized daily volatility.

Q. Is there evidence that Peoples made any response to this change?

A. I have seen none.

Q. Peoples has expressed a fear that in the event spot prices fall below contract prices the ICC will disallow those losses. Has the history of ICC policy regarding gas purchase prudence seen substantial disallowances?

A. The ICC Staff NOI's Manager's Report states that since decontrol of gas and pipeline gas markets began in the early 1980s, the ICC has never found an LDC gas purchase imprudent. (The Citizens' Utility Board (CUB) also asserts this in its reply comments (at 4) in the gas price NOI proceeding.) ICC Staff has at least once in the past viewed a questionable hedging program as "an honest mistake," a position agreed to by the Commission. (NOI Manager's Report at 47-48) It is also not clear why the ICC would set higher standards for financial hedges than it does for physical hedges such as storage, where an LDC can make a mistake-in-retrospect by misjudging the future path of prices in determining injections and withdrawals.

Q. In the Gas Price NOI Manager's Report to the ICC (at 43, fn 21), Donato Eassey of Merrill Lynch is reported as saying at a January 24, 2001 roundtable that "historically, for 13 of the past 15 years, you would have been better off buying in the spot market because the spot market prices were lower than the firm prices." Is this an argument against financial hedges?

A. It is not clear what is meant by "firm" in this context (normally the term refers to a flow pattern rather than price fixity.) If it means fixed price, the statement is referring to an odd historical period. Wellhead prices peaked in 1984, and were on an almost uniform downward trend until recently. If the general trend is downward, locking-in the spot price as of most dates is a losing strategy. Unfortunately, no one ever was in a position to know in advance that spot prices would fall for certain.

The choice between hedged and spot prices is not the same as the choice between fixed and spot prices. If the market's general expectation is that prices will fall, the terms of hedge contracts will reflect that expectation. On average we should see hedged annual bills roughly equal to bills at spot prices but less variable. The relevant comparison is between spot prices and hedged prices looking forward, not, as Mr. Eassey's statement suggests, between spot prices and fixed prices looking backward.

Q. Are there aspects of Peoples' system configuration that make financial risk management impossible?

A. Peoples' Response to City Data Request CTY 1.001 states that there are none. Its response to City Data Request CTY 1.002 goes on to state that there are no aspects of its configuration that make physical risk management preferable to financial risk management.

Q. At the time when Peoples makes its forecasts of gas costs, is it foreclosed from any type of financial risk management transactions?

A. According to the company's response to City Data Request CTY 1.008, no. According to its answer to City Data Request CTY 1.010, the company does consider hedging at the time it identifies its supply pricing options. In doing so, it collects information on futures and forward prices. (CTY 1.011)

Q. Are you aware of any petitions to the ICC by Peoples requesting an explicit statement of policy regarding financial hedges in addition to the Commission's orders accepting hedging in other PGA proceedings?

A. No, even though purchased gas is the single largest cost item and the single largest risk faced by an LDC.

Q. Are you aware of any ICC policies currently in effect that disfavor financial hedging of gas supply costs?

A. No.

Q. Are you aware of any changes in Peoples' hedging practices since September 1999?

A. I have seen no documentation of any such changes.

VIII. CONCLUSIONS

Q. On the basis of your investigation, what do you believe that the ICC should conclude about Peoples' financial hedging policies?

A. The ICC should conclude that Peoples should have financially hedged its gas supplies in the past, and that it should do so in the future.

Q. Doesn't this conclusion come with "20-20 hindsight," i.e. you have examined the reconciliation year, determined that Peoples' ratepayers would have saved if the company had hedged, and on that basis you favor hedging as a policy?

A. No. In this testimony I have explicitly stated that financial hedging may not lower Peoples' gas costs averaged over the coming years. If hedging were no more than an activity that results in the same average price, it would indeed be unproductive, but it does more. The massive growth in use of the NYMEX contract and its derivatives by all sides of the industry indicates that it is indeed producing a valuable service for them protecting against the volatility of gas prices. Peoples' transportation customers often use derivatives where Peoples does not, increasing their own costs compared with those of Peoples' unhedged supplies. Even if ICC policy changes to allow marketers to aggregate groups of small consumers, hedging will still be valuable to those users who remain with Peoples, whether by choice or default.

Q. Please evaluate ICC Staff's position that "one disadvantage [of utility hedging] is that reducing retail customers' exposure to price fluctuations in the spot market reduces economic efficiency, which is one of the objectives articulated in the Public Utilities Act"? (NOI Manager's Report, p. 44)

A. I have no opinion on the content of the Public Utilities Act. I do, however question Staff's concept of efficiency. First, the customers most affected by this proceeding do not see spot market outcomes until their bills arrive some time after the fact. Second, there is an implicit assumption in the reasoning that economic efficiency is exclusively in the domain of spot prices. If I must make substantial investments of time and other resources to mitigate the unpleasant effects of unstable spot prices, the value of price signals is not a 'free lunch." By this standard, Staff should be critical of industrial transportation customers and marketers who "destroy" the value of these signals by engaging in hedge operations and signing contracts that embody price protection, rather than closing plants and laying off workers on an unpredictable day-to-day basis.

Q. Does this end your prepared testimony?

A. Yes.

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AREAS OF QUALIFICATION

Industrial organization; antitrust analysis; regulation, deregulation, and competition in the electricity and gas industries

EMPLOYMENT HISTORY

- Professor of Economics, California State University, Fullerton, 1978-present
- Affiliate, Tabors, Caramanis & Associates, Cambridge MA, 2001-present
- Special Consultant, Econ One Research & Consulting, Inc., Los Angeles, 1999-present
- Senior Advisor, Hagler Bailly Consulting, Arlington, VA, 1996-1998
- Consultant in Economics and Finance, JurEcon, Inc., Los Angeles, CA, 1992-1996
- Lecturer, Graduate School of Business Administration, University of Southern California, Irvine Campus, 1993
- Lecturer in Economics, Claremont Graduate School, Claremont, CA, 1992 Associate Professor of Economics, California State University, Fullerton, 1975-1978
- Research Staff Member, Program Analysis Division, Institute for Defense Analyses, Arlington, VA, 1973-1975

EDUCATION

University of California, Los Angeles, PhD, Economics, 1972
University of Chicago, AB, Economics, 1965

PROFESSIONAL EXPERIENCE

Electric Industry Experience

1999: Retained by Alliance for Retail Markets, consisting of five of the largest retail power marketers operating in California, to testify on post-transition ratemaking and the effects of proposed rules governing default suppliers on future competition. Testimony included evaluation of utilities potential market power in the California Power Exchange [PX], the effects of proposals to modify PX buy/sell rules in effect during the transition, and the effects of post-transition performance-based ratemaking for utilities as default suppliers. Filed testimony in California Public Utilities Commission Dockets A.99-01-019 and 99-02-029 and appeared for cross-examination at hearing.

1999: Retained by independent power producer and marketer Dynegy, Inc. to analyze reports by Market Monitoring Committee of California Power Exchange and Market Surveillance Committee of California Independent System Operator on competition in the states electricity markets and restructuring of Reliability Must-Run [RMR] generator contracts. Filed affidavits in Federal Energy Regulatory Commission Docket Nos. ER98-2843-006 *et al* [two affidavits] and ER98-2843-007 *et al* on factual and logical inaccuracies in these reports, and on consequences of certain RMR-related proposals for future competition.

1997: Retained by attorneys for group of consumers and potential competitors to analyze competitive effects of Long Island Power Authority's acquisition of assets of Long Island Lighting Company, Federal Energy Regulatory Commission (FERC) Docket No. EC97-45-000. Filed affidavit defining markets and identifying new barriers to competition that the acquisition will put in place. Docket concluded without further testimony.

1997: Retained by staff of Illinois Commerce Commission to analyze effects of merger between Union Electric Company and Central Illinois Public Service company on future retail competition in Illinois. Performed innovative market analysis of the merger's effect on the prospects for retail competition in Illinois, in conjunction with Mr. Steven Mitnick using Hagler Bailly's RAMP UP™ data on power generation in the area. Parties to the docket reached settlement prior to formal hearing.

1997: Presentation at annual retreat of Board of Directors of major electric-gas utility, The Convergence of Energy Markets.

1994-1996: Consultant on electricity competition in California, testified in California Public Utilities Commission restructuring proceeding (for Coalition for Choice in Electricity) and

California Energy Commission Biennial Resource Plan Docket (for Enron Corporation). [See below]

1979-1990: Consultant to major investor-owned utility defendant in two antitrust cases. Performed work in market definition, analysis of competition, and economics of access to essential transmission facilities. Also performed work in competitive analysis in FERC price squeeze dockets, including competition between investor-owned utilities and municipal systems for location of industrial loads.

1988-1989: Appointed Consultant to New Zealand Treasury to analyze competitive implications of the creation of State-Owned Enterprise selling and wheeling power to local distributors under that country's antitrust law. Research included travel to New Zealand and production of a report.

Gas Industry Experience

1986: Consultant to Natural Gas Supply Association (producer trade group), co-author of report on feasibility of unrestricted capacity repackaging and retrading for interstate pipelines, used by client as input to testimonies filed at FERC.

Other Relevant Experience

1996: Retained by Attorney General of California to analyze the effect of merger between Union Pacific and Southern Pacific Railroads on competition in California. Prepared reports used as input to Attorney General's intervention at the U.S. Surface Transportation Board.

TESTIMONY

California Public Utilities Commission, Dockets A.99-01-019 and A.99-02-029, investigation and rulemaking on post-transition ratemaking, testified for the Alliance for Retail Markets, San Francisco, Sept. 1, 1999.

U.S. House of Representatives, Subcommittee on Energy and Power, invited testimony on "Financial Aspects of Electrical Restructuring," Washington, D.C., Mar. 28, 1996.

California Public Utilities Commission, Docket R-94-04-031, Rulemaking on California Retail Electricity Competition, expert testimonies for Coalition for Choice in Electricity, June 15, 1994; July 1, 1994; Sept. 16, 1994; and one later date.

California Energy Commission, Docket 93-ER-4, Preparation of the 1994 Electricity Report, expert testimony for Enron Corporation, Oct. 25, 1994, and Dec. 8, 1994; 1996 Electricity Report, expert testimony for Institute for Energy Research, Feb. 16, 1996.

Superior Court of California (Various cases, none related to electric and gas industries).

SELECTED PUBLICATIONS

FERC's California Fix: Opportunities Lost and Found,"*Public Utilities Fortnightly*, Jan. 1, 2001, 32-34.

Co-Author (with Nguyen Quan, Digital Safetynet), Games or Opportunities: Bidding in the California Markets, *Electricity Journal*, Jan.-Feb. 2001, 99-108.

Can Non-Profit Transmission Be Independent? *Regulation* V. 16 (No. 3, 2000), 61-65.

The Governance of Transmission Operators, *Energy Law Journal*, V. 20 (No. 2, 1999), 233-262.

ISO or Transco? It's Not the Profit, But Who Gets the Reward, *Public Utilities Fortnightly*, August, 1999, 52-54.

Co-author (with Jerry Ellig, George Mason University), Electricity: Price Spikes by Design, *Regulation* V. 15 (No. 2, 1999), 20-22.

Preparing for Gas-Electric Convergence: Mergers or Alliances, in Ahmad Faruqui and J. Robert Malko (Eds.), *Customer Choice: Finding Value in Retail Electricity Markets*, (Public Utilities Reports, Inc.), 1999, 79-94.

Co-Author (with Jerry Ellig, George Mason University). Price Spike Redux: A Market Emerged, Remarkably Rational, *Public Utilities Fortnightly*, Feb. 1, 1999, 40-47.

Co-Author (with Jerry Ellig, George Mason University), *Electricity Passes the Market Test: Price Spikes in the Summer of 1998*, Mercatus Institute Monograph, George Mason University, Nov. 1998.

How Gas-Electric Convergence Mergers Affect Competition, *Natural Gas* V. 15 (Sept. 1998), 13-17.

Securitized Transition Costs: Rethinking Who Wins and Who Loses, *The Electricity Journal* V. 11 (June 1998), 58-65.

MW Gamble: The Missing Market for Capacity, *The Electricity Journal*, V. 10, Dec. 1997, 56-64.

Would Anyone Invent Public Power Today? Can Anyone Reinvent It? *The Electricity Journal*, V. 10, Nov. 1997, 52-58.

Stranded in Sacramento: California Tries Legislating Competitive Electricity, *Regulation*, V. 20, Spring 1997, pp. 52-56.

Co-author (with Steven Isser, Hagler Bailly): Stranded Investment: Utility Estimates or Investor Expectations? *Public Utilities Fortnightly*, June 1, 1997, pp. 26-30.

Electric Utility Mergers: The Answer or the Question? *Public Utilities Fortnightly*, Jan. 1, 1996, pp. 20-23.

Electric Utility Mergers: The Wrong Strategy at the Wrong Time, *The Electricity Journal*, V. 8, Jan. 1996, pp. 28-36.

Reducing Risk, Shifting Risk, and Concealing Risk: Why Are There Long-Term Gas Contracts? in J. Ellig and J. Kalt (eds.), *New Horizons in Natural Gas Deregulation* (Praeger), 1996, pp. 195-208.

Stranded Investments, Stranded Intellectuals, *Regulation*, V. 19 No. I, 1996, pp. 47-51.

After Stranding Recovery, What? *Public Utilities Fortnightly*, June 1, 1996, pp. 14-18.

Long-Term Capacity Turnbacks: Not a Short-Term Problem, *Natural Gas*, V. 12, June 1996, pp. 7-11.

Markets of the Future, Utilities of the Past, *The Electricity Journal*, V. 9, Oct. 1996, pp. 58-65.

Mergers and Market Power: Should Antitrust Rule? *Public Utilities Fortnightly*, Nov. 15, 1996, pp. 42-44.

Market Power in Electric Utility Mergers: Access, Energy, and the Guidelines, *Energy Law Journal*, V. 17 No. 2, 1996, pp. 401-424.

Restructuring California's Electric Industry: Lessons for the Other Forty-Nine States, prepared for Institute for Energy Research, Houston, 1995.

Stranded Investment: Pay Up or Mark Down? *Public Utilities Fortnightly,* May 15, 1995, pp. 21-25.

PoolCo: Inventing the Wrong Market, *Public Utilities Fortnightly,* July 1, 1995, pp.43-46.

Regulation Meets Competition: Antitrust in the New Gas Distribution Industry, *Natural Gas,* Nov. 1995, pp. 15-19.

Co-author (with Arthur S. De Vany): Market-Based Rates for Interstate Gas Pipelines: The Relevant Market and the Real Market, *Energy Law Journal,* V. 16 No. 2, 1995, pp. 299-346.

Co-author (with Charles G. Stalon): Decontrol of Wellhead Prices and the First Wave of Gas Industry Restructuring, in Arlon Tussing and Bob Tippee, *The Natural Gas Industry, 2nd. Ed.* (PennWell Books), 1995, pp. 185-220.

Wholesale Pooling: The Monopolist's New Clothes, *The Electricity Journal,* V. 7, Dec. 1994, pp. 64-76.

Unused and Useless: The Strange Economics of Stranded Investment, *The Electricity Journal,* V. 7, Oct. 1994, pp. 12-22.

Co-author (with Andrew Kleit): Antitrust, Rent-Seeking, and Regulation: The Past and Future of Otter Tail, *Antitrust Bulletin,* V. 39, Fall 1994, pp. 689-725.

Fuel Adjustment Clauses: An Idea Whose Time Has Gone, *The Electricity Journal,* V. 7, Feb. 1994, pp. 78-85.

Co-author (with Thomas Hazlett): The Cost of Rent-Seeking: Evidence from Cellular Telephone License Lotteries, *Southern Economic Journal,* V. 59, Jan. 1993, pp. 425-435.

The New Age of Natural Gas: How the Regulators Brought Competition, *Regulation,* V. 16, Winter 1993, pp. 68-79.

Not Quite Free Wheeling: The Energy Policy Act of 1992, *Regulation, V.* 16, Winter 1993, pp. 19-23.

Electric Utility Regulation and Natural Gas Regulation, in *Fortune Encyclopedia of Economics* (Warner Books), 1993.

When Captive Customers Bear the Risk, *Public Utilities Fortnightly,* V. 131, Nov. 15, 1993, pp. 13-16.

Reason for Pessimism: Politics and Policy Cloud the Future of Electricity Competition, *Public Utilities Fortnightly,* V. 131, Sept 15, 1993, pp. 16-20.

Co-author (with Andrew Gill): Does Drug Use Decrease Earnings? *Industrial and Labor Relations Review, V.* 45, April 1992, pp. 419-434.

Deregulating Electricity: What Stands in the Way, *Regulation,* V. 15, Winter 1992, pp. 38-47.

What's Legal And What's Not: The Regulation of Opiates in 1912, *Economic Inquiry,* V. 30, Oct. 1992, pp. 696-713.

Comment on Lee and Ellert, *Research in Law and Economics* V. 13 No. 1, 1991, pp. 213-219.

Co-author (with Andrew Gill): The Determinants of Illegal Drug Use, *Contemporary Policy Issues,* Vol. 9, July 1991, pp. 93-105.

Co-author (with Rodney Smith and Arthur DeVany): Defining a Right of Access to Interstate Natural Gas Pipelines, *Contemporary Policy Issues,* Vol. 8, April 1990, pp. 142-158.

Conjectural Variations and the Nature of Equilibrium in Rent-Seeking Models, *Public Choice,* Vol. 60, Jan. 1989, pp. 31-40.

Reorganizing Electricity Supply in New Zealand: Lessons for the United States, *Contemporary Policy Issues,* Vol. 7, Oct. 1989, pp. 73-90.

Addiction, Compulsion, and the Technology of Consumption, *Economic Inquiry,* Vol. 26, Jan. 1988, pp. 75-88.

The Design of Rent-Seeking Competitions, *Public Choice,* Vol. 56 No. 1, 1988, pp. 17-29.

Co-author (with Rodney Smith and Arthur DeVany): An Open Access Rights System for Interstate Natural Gas Pipelines, prepared for Natural Gas Supply Association, Washington, D.C., 1988.

Regulatory and Market Options for Electricity in New Zealand, prepared for New Zealand Treasury, 1987.

Reinterpreting the Role of Inflation in Politico-Economic Models, *Public Choice*, Vol. 48 No. 2, 1986, pp. 113-124.

Co-author (with Lionel Kalish): The Incentives of Regulators: Evidence from Banking, *Public Choice*, Vol. 36, 1981, pp. 187-192.

Bureaucrats, Legislators, and the Decline of the State Mental Hospital, *Journal of Economics and Business*, Vol. 32, Spring 1980, pp. 198-205.

Long Term Political Agreements and the Origins of Bureaucratic Power, *Public Choice in New Orleans* (G. Tullock, Ed.), 1980, pp. 37-48.

Hedonic Prices and the Structure of the Digital Computer Industry, *Journal of Industrial Economics*, Vol. 27, March 1979, pp. 263-275.

Co-author (with Robert E. Kuenne et. al): A Proposal to Protect the U.S. from Oil Import Interruptions, *Policy Analysis*, Vol. I, Fall 1975, pp. 572-597.

Explorations in a Two-Sector Vintage Model of Economic Growth, dissertation, University of California, Los Angeles, June 1972.

SELECTED RECENT APPEARANCES

5/31/01 Mercatus Institute (George Mason University) Energy Program for Congressional Staff, "Managing Electrical Demand: Prices or Interventions?" U.S. Capitol, Washington D.C.

4/27/01 Canadian Association of Petroleum Landmen Annual Conference, Calgary. Invited presentation "Canadian Gas and the Future of Competitive Power in the U.S."

4/10/01 National Regulatory Research Institute Market Power Conference, Columbus. Invited paper "Market Power In California: Misunderstanding the Opportunities."

3/19/01 Independent Power Producers Society of Alberta Annual Conference, Banff. Keynote address, "California's Electrical Disaster and the Future of Competitive Power."

3/9/01 Institute for Infrastructure Finance, Roundtable of the Americas, Coral Gables, Florida. Invited presentation "California Energy Crisis, Version 3.0: Same Solution, Same Mistake."

12/1/00 U.S. Department of Energy and National Association of Regulatory Utility Commissioners, North American Summit on Harmonizing Business Practices in Energy Restructuring, Dallas. Invited panelist in Accords Forum to formalize policy proposals.

11/17/00 Energy Bar Association Mid-Year Meeting, Washington. Invited panelist, "Retail Markets: Where are We and Why?"

11/9/00 International Association of Energy Economists, Houston. Invited presentation at Petroleum Club of Houston, "Electricity Restructuring: Will Texas Be the Next California?"

10/12/00 *Energy Market Report* Conference on Volatile Energy Prices, Portland. Invited Presentation "Gas Markets and Power Markets: Half of Them Function Well."

7/6/00 Rutgers University 13th Annual Advanced Workshop on Regulation and Competition, Monterey. Invited Presentation "Default Supply in Restructured Electricity Markets."

3/15/00 Energy Expo 2000, Houston. Invited Panelist "The Future of the Energy Industry Driven by Technology and Restructuring."

7/8/99 Western Economic Association 74th Annual Conference, San Diego. Invited Presentation "ISOs vs. Transcos."

7/8/99 Rutgers University 12th Annual Advanced Workshop on Regulation and Competition, San Diego. Invited presentation "Governance: The Unexamined Economics of the ISO."

1/21/99 Canadian Institute of Energy Conference on Integration of Regional Energy Markets, Vancouver. Invited Speaker "East and West Take the Market Test: Price Spikes in the Midwestern Energy and California Ancillary Services Markets."

12/16/98 Co-Chair, The Energy Institute Conference on Western Wholesale Power Markets, Las Vegas. Invited Opening Address "California's Market: What Works and What Doesn't," and Speaker on "Market Power, Gaming, and Antitrust: What Happened to Ancillary Services?"

11/16/98 McGraw-Hill Conference Southeast Power Markets: Strategies for Restructuring, Miami. Invited Speaker on "California's Electrical Restructuring in Retrospect: All Things Considered, Would I Rather Be in Philadelphia?"

10/8/98 The Energy Institute Conference on Northeast Wholesale Power Markets, New York. Invited Speaker on "Debating the Transmission Pricing Options: The Case for Exchangeable Physical Rights."

7/25/98 Law Seminars International, Seminar on Restructuring Electricity in California, Sacramento. Invited Speaker on "After the Morning After Restructuring: Vision or Myopia?"

8/19/98 American Legislative Exchange Council Annual Meeting, Chicago. Invited Speaker on "June 1998: Electricity Markets in Chaos."

7/9/98 Rutgers University 11th Annual Advanced Workshop on Regulation and Competition, Monterey, California. Invited speaker on "Stranded Costs: Theory Meets Practice in California."

6/30/98 Western Economic Association, 73rd Annual Conference, Lake Tahoe. Invited speaker at general session panel on power markets. Invited presentation on "California's Electrical Restructuring: What Economists Did Well and Poorly." Other panelists included Richard Bilas [President, Calif. Public Utilities Commission], Kenneth Lay [CEO, Enron Corporation], and Gordon Smith [CEO, Pacific Gas & Electric].

6/25/98 Co-Chair, The Energy Institute and National Energy Marketers Association Conference on Buying and Selling Electricity in the Western Wholesale Power Market, Las Vegas. Invited address "California's First 100 Days: What Has Changed, What Hasn't, and What Will," and panelist on "Antitrust and Market Power as Monitored by the PX and ISO."

4/27/98 Alberta Energy and Utilities Board and National Energy Board of Canada [CAMPUT] Annual Conference, Banff, Alberta. Invited speaker on "Visions of Regulatory Renewal: A Reality Check from California."

2/19/98 The Energy Institute and Price Waterhouse Conference New Tax Policies and Your Bottom Line, Washington D.C. Invited presentation "Rate-Reduction Securitization Bonds."

2/18/98 Co-Chairman, The Energy Institute and Hagler Bailly Conference on Antitrust in the New Electric Industry. Also presented opening address "Where Will Competition Happen? Relevant Markets and the New Industry," and prepared remarks for panel "Forming an Antitrust Strategy: Plaintiffs and Defendants."

1/29/98 Invited Testimony on Competitive Issues in Electricity Restructuring, National Association of Attorneys General Hearings on Utility Deregulation, San Francisco.

1/21/98 Canadian Institute of Energy Annual Conference, Vancouver B.C. Invited presentation on "The Reality and Unreality of Gas-Electric Convergence."

12/11/97 Co-Chairman, The Energy Institute Annual Conference on Western Power Markets, Las Vegas. Also gave invited presentations on "California's Transition Charge: What Bypass Possibilities Remain?" and "Trading in the Western Systems Power Pool: Still the Best Choice?"

11/12/97 National Association of Regulatory Utility Commissioners Annual Meeting, Boston. Invited panelist on "Alternative Approaches to Stranded Cost Recovery."

10/30/97 Electricity Consumers Resource Council Annual Conference, Washington D.C. Invited address on "What does Securitization Secure?"

9/23/97 National Association of Regulatory Utility Commissioners and U.S. Department of Energy Sixth Annual Conference on Natural Gas Use, Palm Springs CA. Invited panelist at plenary session "Convergence: Trend or Trendy?"

9/19/97 *Energy Daily* Fourth Annual Conference on Retail Competition, Washington D.C. Invited presentations "California's Transition Charge: Obstacle or Opportunity," and "Energy Exchanges: The Long Run and the Short."

8/7/97 George Mason University, Center for Market Processes, Teleconference for State Regulators on Electrical Industry Restructuring, Baltimore. Invited panelist on Stranded Costs.

7/9/97 Rutgers University 10th Annual Advanced Workshop on Regulation and Competition, San Diego. Invited presentation "Electricity Prices: Opaque or Transparent?"

6/17/97 American Public Power Association National Conference, Toronto. Invited Address "Public Power: New Competition, Same Governance."

6/4/97 *Energy Daily* Conference on Stranded Cost Recovery, Washington, D.C. Invited Panelist on "Stranded Cost: The View from the Theorists."

6/3/97 *Energy Daily* Second Annual Finance Forum, Washington, D.C. Invited Presentation "BTU Convergence Strategies: The Value of Option Value."

4/9/97 Gas/ Power Mart 97, Chicago. Invited presentation "FERC Restructures the West: California's Fault Line Crosses the Beltway."

3/18/97 Independent Power Producers Society of Alberta, Banff, Keynote Speech at Annual Meeting "Gas and Electricity: Is It Convergence, or Just Perfection?"

2/14/97 American Public Power Association CEO Roundtable, Palm Springs, CA. Invited presentation. "Competing for Assets or Competing for Customers? Public Power in a Commodified Electricity Market."

12/13/96 *Energy Daily* Annual Conference, Williamsburg, Va. Invited presentation "Does Converging Mean Merging? Gas/ Electric Mergers in the New Energy Markets."

10/20/96 National Association of Regulatory Utility Commissioners and U.S. Department of Energy National Electricity Forum, Santa Fe. Invited presentation and panel participation, "Convergence of the Electric and Gas Industries."

9/30/96 Center for Energy Studies, Louisiana State University, Baton Rouge. Invited Presentation "Non-Bypassable Politics: The Content of California's Electrical Restructuring."

9/20/96 *Energy Daily* 3rd Annual Retail Wheeling Conference, Washington, D.C. Invited presentation "Nonbypassable Politics in California: AB 1890 Has Landed."

7/25/96 Western Electric Power Institute conference "Transmission: Forever Changed," Portland, Ore. Presented closing lecture "Transmission Businesses: Long-Term Markets for Short-Term Power."

7/13/96 Congressional Administrative Assistant Summer Retreat, Williamsburg, Va. Invited panelist on "Utility Deregulation: Opening Markets for Electricity."

7/11/96 Rutgers University 9th Annual Advanced Workshop on Regulation and Competition, San Diego. Invited Presentation "Mergers and Market Power in the Post-EPAct Electricity Industry."

6/19/96 *Energy Daily* Conference "FERC Rules 888 and 889: Functional Unbundling of the Electric Industry," Washington, D.C. Panelist on "The Bottom Line: The Impact on Transmission Pricing and Wholesale Power Marketing."

6/17/96 Co-Chairman (With J. Michael Parrish, Reid & Priest), *Energy Daily* Conference "Electric Utility Mergers and Acquisitions," Washington, D.C. Also presented "Market Power in Electric Utility Mergers: The Case for an Access-Based Standard."

5/6/96 Center for Market Processes, George Mason University, presentation on "Fundamentals of Power Deregulation" to Congressional Staff, U.S. Capitol, Washington, D.C.

4/29/96 U.S. Department of Energy Fifth Annual Natural Gas Conference, St. Louis. Invited presentation "I Gotta Be Me -- The Costs and Benefits of Not Merging."

12/11/95 *Energy Daily* Annual Conference "Financial and Physical Strategies in a Changing Electrical Marketplace," San Diego. Invited presentation "Stranded Costs and Stranded Benefits: The Regulatory Compact in a Competitive Power Industry."

10/17/95 Co-Chairman (with Charles Bayless, CEO of Tucson Electric Power), Executive Enterprises Annual Conference on the Western Electric Power Market, San Francisco. Also gave invited presentation "Utility Mergers and Acquisitions in the West."

9/14/95 Participation with Governors of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, New Jersey, and Pennsylvania in panel on electricity deregulation at Coalition of Northeastern Governors Annual Conference, Mount Washington, N.H.

8/17/95 Illinois Commerce Commission and Illinois State University Workshop for Commissioners on Electricity Restructuring, Eagle Creek, Ill. Presented lecture "Stranded Investment in the New Power Industry."

2/14/95 U.S. Department of Energy Annual Natural Gas Conference, Orlando. Invited presentation "Relevant Markets and Real Markets: Antitrust in the New Gas Distribution Industry" and served as panelist on "Performance-Based Ratemaking for Gas Utilities."

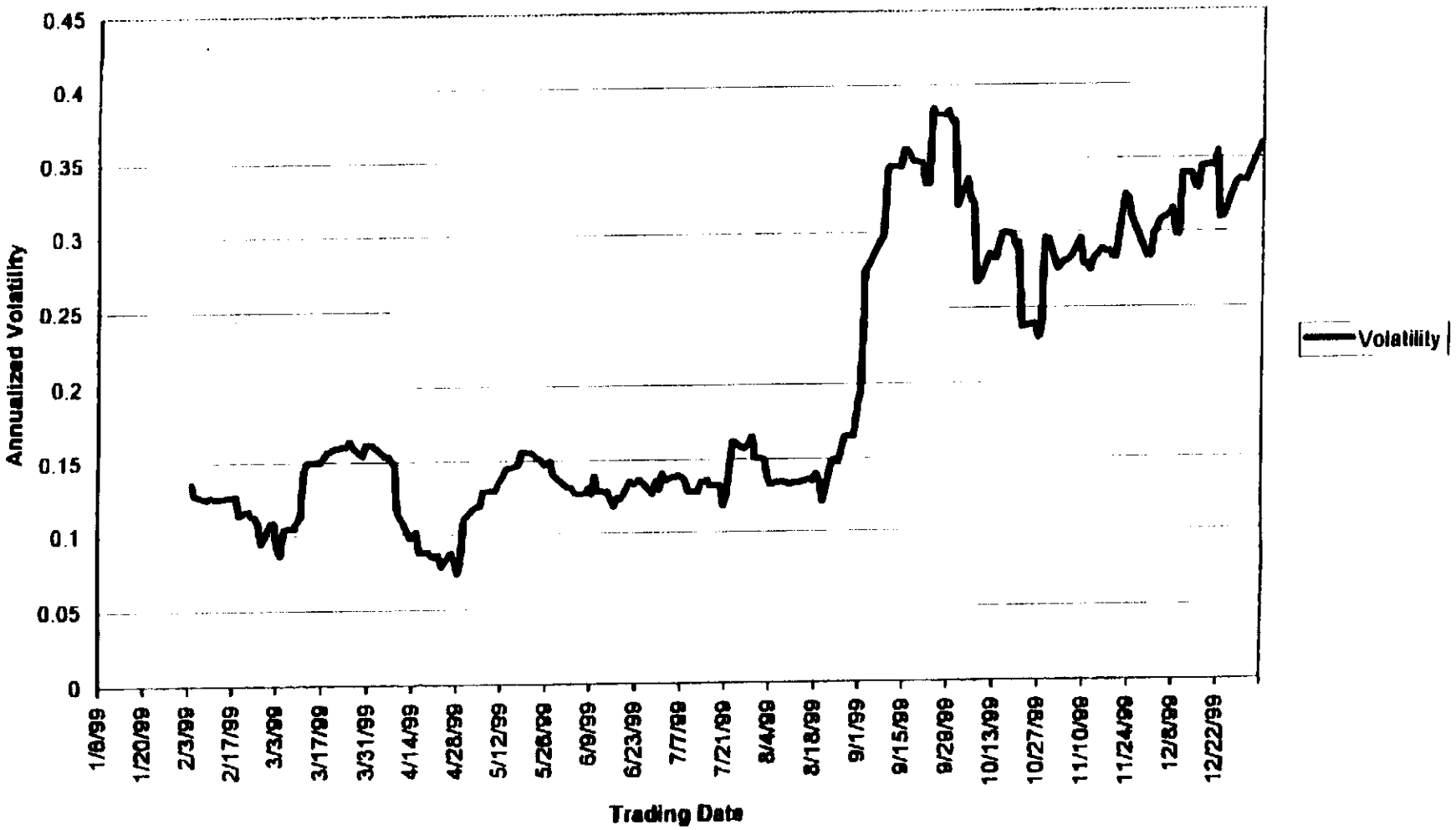
PROFESSIONAL AFFILIATIONS AND HONORS

- Member, Registry of Independent Scientific and Technical Advisors, Private Adjudication Center, Duke University School of Law, 2001 - present
- Resident Scholar, Center for Advancement of Energy Markets, 1999 - present
- Co-Editor, *Contemporary Economic Policy*, peer-reviewed journal of the Western Economic Association, 1999 - present
- Adjunct Scholar, Institute for Energy Research, 1995 - present
- Adjunct Scholar, Cato Institute, 1995 - present
- Outstanding Professor, School of Business and Economics, 1989
- Advisor on electricity denationalization to government of New Zealand, 1986-1987
- Coeditor of *Contemporary Policy Issues*, journal of the Western Economic Association, 1983-1988
- NSF research award to study financial institutions deregulation, 1979

MISCELLANY

- Author of bi-weekly column "Power Moves," appearing in *Power Executive* and *The Desk*
- Energy correspondent for National Public Radio, KQED California Report
- Numerous appearances in print and broadcast media, and before non-industry groups

Volatility of 12-month Futures Strip Average (Oct-99-Sep-00)



Annual (Oct-99 - Sep-2000) Average Futures Price by Trading Date